DOCUMENT RESUME

ED 270 788 CS 209 859

AUTHOR Stiggins, Richard J.; And Others

TITLE Measuring Thinking Skills in the Classroom: A Teacher's Guide. Final Report of the Regional Study Award Project.

INSTITUTION Northwest Regional Educational Lab., Portland, Oreg.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.
PUB DATE Nov 85
CONTRACT 400-83-0005
NOTE 58p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Cognitive Processes; *Critical Thinking; Divergent Thinking; *Educational Assessment; Educational Planning; Elementary Secondary Education; *Evaluation Methods; Evaluative Thinking; Inferences; Language Arts; Logical Thinking; *Measurement Techniques; Problem Solving; Recall (Psychology); Science Instruction; Social Studies
IDENTIFIERS *Thinking Skills

ABSTRACT

Designed to contribute to the growing effort to teach critical thinking skills, this guide provides teachers with (1) a simple, usable set of definitions for recall, analysis, comparison, inference, and evaluation; (2) brief explanations of three common forms of classroom assessment (oral questioning during instruction, paper and pencil objective test items, and performance assessment); and (3) a planning strategy for crossing levels of thinking skills with forms of classroom assessment in a way that uses assessment to promote student skill in higher level cognitive operations. For purposes of illustration, the guide includes a range of examples of assessments for all grade levels covering concepts taught in science, social studies, and language arts (composition and literature). The guide also provides space for users to fill in examples relevant to their particular subject areas. (HOD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED270788

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

1985 REGIONAL STUDY AWARDS FINAL PRODUCT

MEASURING THINKING SKILLS IN THE CLASSROOM A TEACHER'S GUIDE

Final report of the Regional Study Award Project

Richard J. Stiggins
Northwest Regional Educational Laboratory

Evelyn Rubel
Salem (Oregon) Public Schools

Edys Quellmalz
Stanford University

Northwest Regional Educational Laboratory
300 S.W. Sixth Avenue
Portland, Oregon 97204
Telephone (503) 248-6800

CS209859

The work upon which this publication is based was performed pursuant to Contract No. 400-83-0005 of the National Institute of Education. It does not, however, necessarily reflect the views of that agency.

MEASURING THINKING SKILLS IN THE CLASSROOM
A TEACHER'S GUIDE

Final Report of the Regional Study Award Project

Richard J. Stiggins
Northwest Regional Educational Laboratory

Evelyn Rubel
Salem (Oregon) Public Schools

Edys Quellmalz
Stanford University

John Mahaffy, Director
Center for Professional Development
Northwest Regional Educational Laboratory
300 S. W. Sixth Avenue
Portland, Oregon

November 1985

Prepublication copy: Do not quote or duplicate without permission of the authors.

Table of Contents

	Page
MEASURING THINKING SKILLS	1
The Benefits of Assessing	3
The Assessment Planning Framework	5
Defining Thinking Skills	6
Forms of Classroom Assessment	9
The Basic Chart	11
LEARNING TO PLAN THE ASSESSMENT	15
Study Step 1: Reviewing Model Charts	15
Study Step 2: Using the Generic Chart	20
Study Step 3: Using the Formula to Generate a Complete Chart	22
Study Step 4: Adding Variety to the Questions	23
Final Step: A Progress Check	27
MAKING ASSESSMENT WORK IN THE CLASSROOM	29
Developing Questions for Daily Use in The Classroom	29
Managing the Assessment Process	32
SUMMARY	37
REFERENCES	38
APPENDIX A Improving Classroom Assessment Bibliography	39
APPENDIX B Answers to Quiz	45
APPENDIX C Cognitive Domain Levels According to Bloom	46

MEASURING THINKING SKILLS

"There are one-story intellects, two-story intellects and three-story intellects with skylights. All fact collectors who have no aim beyond their facts are one-story people. Two-story people compare, reason, generalize, using the labor of the fact collectors as their own. Three-story people idealize, imagine, predict—their best illumination comes from above through the skylight."

Oliver Wendell Holmes

If we are to teach thinking skills, we must plan and conduct instruction in a careful manner. Careful planning entails diagnosis of the thinking skills students have already mastered and the skills they have yet to learn. In addition, we must be prepared to determine the impact of our instruction once completed. Diagnosis, monitoring and evaluation require that the teacher be capable of measuring thinking skills in the classroom on a day to day basis. The measurement of student achievement is a challenging process even when our goal is simply to measure student recall of facts and information. When we add the challenge of measuring the students' ability to use that information to think critically and solve problems, the measurement process takes on new and imposing dimensions of complexity.

In the past, we have failed to rise to this challenge. A recently completed study of teacher-developed tests in a large metropolitan school district revealed that nearly three quarters of the thousands of test items analyzed across grade levels tested recall of facts and information (Fleming & Chambers, 1983). Very few tested the application of higher order thinking skills. Few tested the ability to analyze available knowledge or to draw inferences about or with newly learned facts and information. Few items tested students' ability to draw conclusions and support evaluative judgments.

Yet, the development of thinking skills is becoming a higher and higher priority among educators and critics of education. As this interest has intensified, the inadequacy of our current instruction and assessment of these skills has become apparent. Quellmalz (1985a) has characterized the problem as follows:

> The call for attention to higher-order thinking skills rings throughout the educational system. Educators, policymakers and the public agree that higher-order skills are important but neglected in curricula and tests and, therefore, underdeveloped in students. We have sufficient rhetoric and evidence to establish the need for renewed emphasis on higher-order skills; what we lack is consensus on what higher-order thinking is, on how to measure its outcomes, and on how to teach it. Furthermore, despite the lip service paid to the significance of higher-order thinking skills, administrators, teachers and students may view thinking skills as tangential to required courses of study, as appropriate only for older, high achieving students, or as too demanding of time and effort. To compound the problem, administrative and economic support for projects have often been too weak or short-lived to establish and maintain thinking skills assessment and curricula (p. 1).

Efforts are now underway on several fronts to begin to deal with this problem. For instance, researchers are striving to understand the thinking process and translate their understanding into practical classroom terms (Quellmalz, 1985b). Authors of instructional materials are designing texts and study guides which move beyond recall (see the junior high social studies text by Joyce and others, 1980, for example). Several states, including California, Connecticut and Colorado, are instituting statewide assessments of critical thinking skills with the intent of raising these skills to higher levels of priority in local curricula. Many other states are launching new instructional programs in this arena.

This guide is designed to contribute to the growing effort to teach critical thinking skills by providing teachers with simple but very powerful

tools to use in measuring those skills on a day-to-day basis in the classroom. Specifically, it provides:

- a simple, usable set of definitions of thinking skills,
- brief explanations of three common forms of classroom assessment, and
- a planning strategy for crossing levels of thinking skills with forms of classroom assessment in such a way as to use assessment to promote student skill in higher level cognitive operations.

In addition, teachers are given a series of very practical guidelines for making the assessment planning strategies work effectively in the classroom.

The guide is written for teachers. However, those who support the teachers' instructional efforts (administrators, curriculum specialists, etc.) should also find it useful. The strategies discussed can be applied to all subjects at all grade levels. For purposes of illustration, we have included a range of examples of assessments covering concepts taught in science, social studies, and language arts (composition and literature). Examples also illustrate elementary, junior high and high school levels of instruction. To aid in learning and using these strategies, space is provided throughout the guide for users to fill in examples relevant to their particular context. This feature of the guide makes it easy for teachers and others to begin to address issues related to teaching critical thinking skills.

The Benefits of Assessing

Teachers who know how to assess thinking skills derive many benefits. The most important of these was mentioned at the beginning of the guide. Our goal in education is to teach students <u>to use</u> the information at their disposal. We want them to do far more than just restate facts. We want them to think. Very simply, we are doomed to fall far short of this goal if we are unable to

monitor development and measure student mastery of the thinking skills we seek to impart. If we cannot measure skills mastered, we cannot determine what to teach next. If we cannot measure the skills we teach, we cannot know if instruction was effective.

From another perspective, it is important for the teacher to be able to measure higher order thinking skills because our tests do more to tell students what we expect of them than any other single factor. Much of what students study and learn is stimulated by what they think we as educators expect of them. They learn those expectations from our tests. If we test recall, they learn the facts. If we test more, they prepare themselves to deliver more.

From still another perspective, teachers who know how to devise their own measures of thinking skills have more degrees of freedom in designing instructional plans. They can adjust their questions to new textbook adoptions and not be chained to text materials that don't teach thinking skills. Teachers skilled at measuring thinking skills can tailor their assessments and instruction to unique needs and capabilities of students, thus permitting individualization of instruction around categories of cognitive operation. And they can critique text materials being considered for adoption from the perspective of their likely influence on students' thinking skills.

This role of the teacher as a critical consumer also becomes important from another point of view. Teachers skilled at measuring thinking skills can review and evaluate standardized tests being considered for adoption by the district--thus ensuring that tests selected match instructional priorities in their classrooms. Not only must these published tests be selected to cover appropriate content (i.e., match the objectives of the teachers whose students

are to be tested) but they must also measure thinking skills taught in the classroom. To the extent that the test fails to match local content or thinking skill priorities, that test will provide invalid information regarding student achievement.

The Assessment Planning Framework

Our goal is to explain how basic thinking skills--skills students must use in solving significant academic and life problems--can be assessed by using three common forms of classroom assessment. To achieve that goal, we provide training in measuring five fundamental cognitive operations: Recall, analysis, comparison, inference and evaluation, measured via (a) oral questioning during instruction, (b) paper and pencil objective test items and (c) performance assessment (i.e., based on teacher observation and judgment). These elements are defined in detail below. When combined, these dimensions provide a simple, yet comprehensive framework from which to view the classroom measurement process.

In preparing a guide to address this framework, we made several assumptions about the teachers who will use the guide. We assumed that teachers (a) are proficient at writing basic test items using common item formats (e.g., essay, multiple-choice, true/false, etc.), (b) are proficient at designing and using measures of student achievement based on observation and professional judgment, and (c) are knowledgeable about the subject matter they teach. We have made these assumptions for two reasons. First, space limitations will not allow instruction in these areas. And second, these skills are not essential to <u>understanding</u> our planning strategies. However, if teachers are to use our planning strategies effectively in the classroom,

basic test development skills and a keen knowledge of content are very important. Therefore, for the reader who wants assistance in these areas, we suggest resources to use in parallel professional development efforts. (See Appendix A)

Defining Thinking Skills

If we are to measure thinking skills effectively and efficiently in the demanding, fast-paced world of the classroom, we must start with a clear and usable definitions. The task of specifying the domain of thinking skills has challenged philosophers, cognitive psychologists and subject-matter experts for decades--even centuries. We will not bore you with the details of that history of discovery. Instead, we have synthesized prior conceptual frameworks into one we think will suffice for most classrooms (Quellmalz, 1985). When we compare the basic cognitive operations involved in the problem solving and critical thinking skills proposed by philosphers, psychologists and educators, five fundamental components recur: recall, analysis, comparison, inference and evaluation. These skills are used at varying points in the problem solving and critical thinking processes as students 1) identify the problem type or central issue, 2) identify and find relevant information, 3) connect relevant information, and 4) evaluate solutions and conclusions. The skills are also major forms of explanation and inquiry in their own rights.

We do not characterize the skills as a rigid hierachy since there may be a wide range of difficulty within each category. Analyses may be simple or complex, depending upon the scope and complexity of the problem; similarly, evaluations may be easy or difficulty. Generally speaking evaluation and inference draw upon the other reasoning operations as well. The primary

distinction among these five categories of thinking skills is that they refer to different ways that students relate and use information:

Recall: Most tasks require that students recognize or remember key facts, definitions, concepts, rules and principles. Recall questions ask students to repeat verbatim or to paraphrase given information. To recall information, students need most often to rehearse or practice it, then to associate it with other, related concepts.

Analysis: In this operation, students divide a whole into component elements. Generally the part/whole relationships and cause/effect relationships that characterize knowledge within subject domains are essential components of more complex tasks. The components may be the distinctive characteristics of objects or ideas or the basic actions of procedures or events.

Comparison: These tasks ask students to recognize or explain similarities and differences. Simple comparisons require attention to one or a few very obvious attributes, or component processes, while complex comparisons may require identification and differentiation among many attributes or component actions.

Inference: Both deductive and inductive reasoning fall in this category. In deductive tasks, students are given a generalization and asked to recognize or explain the evidence that relates to it. Applications of rules and "if-then" relationships require inferencing. Inductive tasks give students the evidence or details and ask students to come up with the generalization. Hypothesizing, predicting, concluding and synthesizing all require students to relate and integrate information.

Evaluation: These tasks ask students to judge quality, credibility, worth or practicality. Generally we expect students to use established criteria and explain how these criteria are or are not met. The criteria may be established rules of evidence, logic or shared values.

Here are some simple illustrations of how the higher-order reasoning skills appear as major forms of explanation and inquiry in three general subject matter domains:

	Science	Social Science	Literature
Analyze	Identify components of a process, features of animate and inanimate objects	Components of arguments Elements of an event	Identify components of literary, expository and persuasive discourse
Compare	The properties of objects or components of processes.	Causes and/or effects of separate events. Social, political, economic, geographic features.	Meanings, themes, plots, characters, settings, arguments
Infer	Draw conclusions. Make predictions. Pose hypothesis tests and explanations.	Predict, hypothesize, conclude, interpret using historical, social, political, economic, geographic information.	Theme, significance, characters' motivations. Interrelationships of literary elements.
Evaluate	Soundness of procedures. Credibility of conclusions. Significance of findings.	Credibility of arguments, decisions, or reports. Significance	Believability. Significance. Form. Completeness. Clarity.

Others have subdivided thinking skills in other ways. Bloom and others (1956) have suggested six levels of cognitive operation which have been extensively studied and applied by educators. These might well have been substituted for our five levels in this guide. In fact, they are outlined in Appendix C. We adopted those outlined above to illustrate our assessment planning strategy because of their simplicity. But the key to success in measuring and teaching thinking skills is to adopt a taxonomy of skills and use them consistently.

Forms of Classroom Assessment

The measurement of student achievement can take many forms in the classroom: some formal and some informal; some individual and some group; some standardized for all classrooms and some tailored to the specific classroom context. For the purpose of illustrating these measurement strategies, we have selected three of the most common forms of assessment: oral questions asked during instruction, paper and pencil tests and performance tests. Each is described and illustrated below.

Oral questions. These are the questions teachers ask during instruction for the purpose(s) of (a) stimulating thought and discussion among students and (b) providing teachers with a brief sample of evidence by which to monitor students' skill development and achievement. These questions may stimulate students to think divergently and creatively, exploring interpretations of the knowledge at their disposal. Oral questions may be directed to an individual student (volunteer or not) or of the class as a whole to stimulate a discussion. They are open-ended, often allowing for more than one correct answer. They may come at a rapid-fire pace, demanding brief responses and quick follow up questioning by the teacher, or they may be posed in a more thoughtful manner, allowing extended explanation and interpretation. This is an informal mode of monitoring and assessment that is most often an integral part of instruction. For example, the teacher might ask, "What are some ways we might have avoided use of the atomic bomb at the end of WWII?" Although this is not part of the formal testing for grading purposes, it is very much a part of the classroom monitoring and evaluation environment.

Paper and pencil tests. This form of assessment includes the test items teachers include in their more formal written tests and quizzes for purposes of diagnosis, grading or placement. They have traditionally been used to

measure the students' ability to think convergently to arrive at a best or correct answer, however open-ended formats are also used. The student responds in some written (verbal or symbolic) form. Formats include selection items (multiple-choice, true/false, matching), supply items (fill in, short answer) and essay items (limited and extended response). Paper and pencil assignments may be used for in-progress monitoring or for more formal assessments conducted after instruction is completed. Many educators tend to link selection items with the measurement of recall and essay items with the measurement of higher order thinking skills. However, as we proceed through the guide, we will strive to show that multiple-choice and true/false items also can serve to measure some higher-order thinking skills. For example:

Was infantry invasion of Japan a viable alternative to the use of the atomic bomb to end WWII? If so, why? If not, why not?

a. Yes, transport ships were available in sufficient numbers.

b. Yes, island defenses in Japan were minimal.

c. No, estimated casualties would have been much greater.

d. No, Japan was on the verge of having an atomic bomb.

Performance tests. In this form of assessment, the teacher observes and judges an activity in progress or a product developed by the student. Students are presented with a set of instructions (performance exercise): they respond in some overtly behavioral manner, and teachers observe and evaluate the quality of the behavior and/or resulting product in terms of pre-specified performance standards or criteria (Stiggins, 1984). These might be formal assessments for grading purposes or less formal assessments integrated into instruction. Such assessments play key roles in

the measurement of reasoning strategies, communication skills, motor development, foreign language proficiency, science laboratory procedures, etc. Performance assessments call upon the student to demonstrate what they know by doing it and, in some instances, to explain their strategies.

The three forms of assessment were included in the guide because many teachers already design and use them. Therefore, they can control the extent to which their assessments measure more than simple recall. Tests that accompany textbooks and items that appear on standardized achievement tests also measure student achievement, but teachers typically have less control over these. To the extent that teachers can play a role in the selection of texts or published tests and want those materials to measure specific higher thinking skills, they can use information presented in this guide to screen and select materials that reflect higher-order objectives of instruction in their classrooms.

The Basic Chart

By combining the five types of thinking and the three forms of classroom assessment described above, we create a framework or chart to guide classroom measurement of key concepts.

ASSESSMENT PLANNING CHART

	Oral Questioning	Paper & Pencil Tests	Performance Assessment
Recall			
Analysis			
Comparison			
Inference			
Evaluation			

Using this chart, we can select one element of instruction at a particular grade level—say, an elementary science unit on the SOLAR SYSTEM—and show how the nature of the assessment varies across levels and form of assessment.

Beginning with simple recall: During instruction, we might pose this question to the class:

> Today, we are beginning a unit on the solar system. What is the solar system?

Or, we might pose an analysis question:

> Let's see if we can identify the parts of our solar system.

Oral questioning in class might also deal with comparisons:

> We have been sending unmanned space flights to Mars. How is Mars like the earth? How is it different? What about size, distance from the sun, surface, atmosphere, etc.?

The completed chart on page 13 illustrates the remaining categories under oral questioning.

Moving to more formal paper and pencil testing, the questions might look like this:

Recall: Define solar system.

Analysis: Match each planet with its unique characteristics:

___Earth	a. has rings of gas and ice crystals
___Mars	b. appears red in night sky
___Venus	c. farthest from the sun
___Saturn	d. is known to support life
___Pluto	e. called the evening star
	f. revolves around the sun
	g. is part of the Milky Way

The remaining paper and pencil testing for other skill categories appear in the chart on the next page.

ASSESSMENT PLANNING CHART

GRADE LEVEL Elementary SUBJECT Science TOPIC Solar System

	ORAL	TEST	PERFORMANCE
RECALL	Today we begin a unit on the solar system. What do you think the solar system is?	Define solar system.	Choose the name of a planet. I (the teacher) am the Sun. Put yourself in orbit around me considering where you are in relation to other planets and how far you are from the Sun. Use 6 inches to represent each million miles of distance. Performance criteria: Recall--Do students remember order and distance? Comparison--Can they reflect relations among planets? Inference--Can they use the distance scale?
ANALYSIS	Let's see if we can think of all of the parts of our solar system.	Match each planet with its unique characteristics: ___ Earth a. has rings of gas and ice ___ Venus b. appears red ___ Saturn c. supports life ___ Etc. Etc.	
COMPARISON	We've been sending unmanned space flights to Mars. How is Mars like Earth? How is it different?	The Sun and the planets are all components in our solar system. How does the Sun differ from the planets?	
INFERENCE	The planets rotate around the Sun and revolve in a definite pattern. What do you think might happen if one of the planets suddenly changed orbit?	Imagine that we discovered a new planet. Which of the following are we likely to know first? (a) its size (b) how many moons it has (c) surface terrain	
EVALUATION	Which part of the solar system is most important to us here on Earth? Why?	If you were selected to travel to Mars, would you go? Why or why not?	

Finally, performance assessment (observation and judgment) can serve an instructional function:

> Choose the name of a planet. I (the teacher) am the Sun. Put yourself in orbit around me considering where you are in relation to other planets and how far you and the other planets are from the Sun. Use one inch to represent each million miles of distance.

For each individual child, this measures recall (order and distance), analysis and comparison (in relation to other planets) and inference (use of a measurement scale). For those students who place themselves incorrectly, the teacher can ask follow-up oral questions to determine which component skills are not mastered.

In the next section, we provide a range of examples of these kinds of tables covering concepts studied in a number of subjects at various grade levels. These examples are followed by a specific and very practical set of guidelines for developing and using such charts for your own classroom assessment.

LEARNING TO PLAN THE ASSESSMENT

"Questions are the creative acts of intelligence"

Frank Kingdom

In this part of the guide, we have collected examples of completed and partially completed ASSESSMENT PLANNING CHARTS. Each chart focuses on one topic or concept and presents examples of how that concept can be assessed for all five skill categories using all three forms of assessment. For the sake of illustration, we have selected topics from three general subject matter areas taken from three different grade levels. Within each cell in the matrix, we have selected a topic that is somewhat familiar to all:

Elementary English: Poetry

Junior High Social Studies: Electoral College

Junior High Science: Energy

High School Social Studies: Branches of Government

Study Step 1: Reviewing Model Charts

As a study strategy, we recommend that the reader proceed through these charts one by one examining the exercises presented in each. Occasionally, we have inserted a blank cell in the chart. The reader is invited to fill in the blank. Try to complete each chart as best you can. If some cells are just too difficult to fill, leave them blank. You can return and complete them later.

ASSESSMENT PLANNING CHART

GRADE LEVEL Elementary SUBJECT English TOPIC Poetry

	ORAL	TEST	PERFORMANCE
RECALL	Let's see if we can tell what poetry is.	An Haiku has _____ lines and _____ syllables.	Compare some work of local poets. Choose the one you like best. As you know, artists are often not "recognized" until after their deaths so they often live in poverty. You serve on a board which could help this poet you have chosen. How would you go about convincing the board to give funds to this particular poet? Prepare your materials for convincing. Try them out on the class.
ANALYSIS	Let's see how many different kinds of poetry we can list.	Tell the purpose of an acrostic in poetry and write a brief example	
COMPARISON	Let's compare several kinds of poetry as to rhyming technique, rhythm, structure, etc. Shall we first compare a limerick and a couplet?	Put an H if a Haiku, a C if a couplet, and a D if a diamente. (a) has 17 syllables (b) has 2 lines (c) has 7 lines (d) has 3 lines	
INFERENCE	Have several poems for use on the overhead or written on the board for handouts. Students choose a poem and imagine how it might sound written as another form. Haiku as a couplet, etc. Put examples on the board.	What kind of poem is likely to be written by a Japanese person? (a) limerick (b) couplet (c) Haiku (d) cinquain	
EVALUATION	Do you think it's important to encourage the writing of poetry? Why or why not?	Some poetry is very structured. Do you prefer it to the less structured? Why or why not and cite two examples of the kind of poetry you prefer.	

BEST COPY AVAILABLE

ASSESSMENT PLANNING CHART

GRADE LEVEL Junior High **SUBJECT** Social Studies **TOPIC** Electoral College

	ORAL	TEST	PERFORMANCE
RECALL	What is the electoral college?	As a member of the electoral college, you must vote: (a) according to your own judgment (b) as your constituency voted (c) as the party tells you (d) only if you wish to do so	Assume you're a US Senator. Propose a constitutional amendment that would make the popular vote the sole criterion in electing a president. Your amendment would do away with the electoral college. Prepare a speech to Congress defending your amendment. Be sure to: (a) analyze all elements of the issue (b) compare elections with and without the college (c) show how the voters are likely to react (d) state and defend your values (Or conduct a simulated debate on the Senate floor.)
ANALYSIS	How does the electoral college work?	Analyze the steps in the presidential election process showing where the electoral college comes into play.	
COMPARISON	How do the social conditions that existed when the electoral college was formed differ from conditions now?	What is meant by the election theme "one person, one vote" and how does that relate to the electoral college?	
INFERENCE	If you were a presidential candidate elected by popular vote, could you still loose the election? How?	In which state is the electorate likely to oppose the use of the electoral college: (a) California (b) Illinois (c) North Dakota	
EVALUATION	Should the electoral college be abolished? Why or why not?	Which of the following is a reason for maintaining the electoral college? (a) (b) (c)	

BEST COPY AVAILABLE

ASSESSMENT PLANNING CHART

GRADE LEVEL Junior High SUBJECT Science TOPIC Energy

	ORAL	TEST	PERFORMANCE
RECALL	Today we're beginning a unit on energy. Let's develop a definition for the word energy.		You are planning to build a new house. Compare the energy sources. Decide which you'll use in your house. Explain how you'll use the sources you've chosen. Also tell why you chose that source for that particular job. You may draw the plans showing the various places of energy use if you wish. If you do this with a good explanation key then you need not write an explanation.
ANALYSIS		What are the three effects of mining and burning coal?	
COMPARISON	Let's compare the costs of using the following energy sources: nuclear, solar, coal, water, wood and wind.		
INFERENCE	If we were suddenly cut off from the supply of petroleum from the Middle East, what would be some short term problems? What would be some long term solutions to those problems?		
EVALUATION		Write a short paper telling which is the most important energy source for the US. Give at least 3 reasons why it's most important.	

BEST COPY AVAILABLE

ASSESSMENT PLANNING CHART

GRADE LEVEL High School SUBJECT Social Studies TOPIC Branches of the Government

	ORAL	TEST	PERFORMANCE
RECALL	Who's in charge of the executive branch of government? The judicial branch? Legislature?		Set the class up as a democracy with three branches of government. Go through the actual process of passing a law. Determine if students know and can carry out each function. Strive to demonstrate the interactions among branches.
ANALYSIS		What can the executive branch do about an unfair law?	
COMPARISON	In America we have Congress. In Canada their legislature is called Parliament. How do they differ in structure? OR Compare the structure of federal government with the structure of your state government.		
INFERENCE		You've decided motorcycles cause too many accidents. You'd like them banned from federally funded highways. To which government branch would you first appeal? (a) executive (b) judicial (c) legislative	
EVALUATION	Which branch of the government is most important? Why?		

BEST COPY AVAILABLE

Study Step 2: Using the Generic Chart

Now that this review and fillin task is completed, it may have become apparent that questions tapping the same level of cognitive operation have a great deal in common across charts, even though the topic changes. This fact has allowed us to develop a "generic chart"—a kind of formula chart in which we have provided generic questions in which the teacher simply fills in the concept or topic to be assessed.

AFTER YOU HAVE ATTEMPTED TO COMPLETE ALL OF THE PREVIOUS CHARTS, study the generic chart and use its formula questions to fill in any blanks you were unable to complete the first time through the charts presented in Step 1.

ASSESSMENT PLANNING CHART

GRADE LEVEL _____ SUBJECT Generic Chart TOPIC _____

	ORAL	TEST	PERFORMANCE
RECALL	What is _____?	What is the best definition for the term _____? (a) (b) (c)	Give a speech/plan a debate in which you use what you know about _____ to judge its _____. Give reasons to explain your point of view.
ANALYSIS	How does _____ work?	What are the basic elements (ingredients) of _____?	
COMPARISON	Compare the _____ to _____.	What is the major difference between _____ and _____? (a) (b) (c)	
INFERENCE	What do you think would happen if _____?	Which of the following is a likely result of _____? (a) (b) (c)	
EVALUATION	Is this a satisfactory solution to this problem _____? How would you do it? (Follow up: why?)	Here is the issue: _____. Which side are you on and why?	

BEST COPY AVAILABLE

Study Step 3: Using the Formula to Generate a Complete Chart

The next step in the learning process is to use the generic chart to complete an entire chart on a topic of interest and at a level appropriate to you. Here we must add a caution. We do not recommend on-going reliance on the generic chart. It is merely included here as a learning aid. Once the reader understands the levels and the process of composing an ASSESSMENT PLANNING CHART, it will become clear that many different kinds of probes can trigger student thinking. We illustrate this fact below. But for now, use the generic chart to generate a complete ASSESSMENT PLANNING CHART on a topic of relevance to you. If you need to make minor revisions to the wording of the generic item form to write a good exercise, feel free to do so. It is intended for flexible use.

Study Step 4: Adding Variety to the Questions

Now lets move from the "formula" chart to the generation of charts with a greater variety of questions. The first key to expanding the range of questions you can pose is to focus on the trigger or action verb used to describe the problem to the student. Start with these and add some of your own if you can:

If you want to measure:	Use these key words in the exercise:		Illustration
Recall	define identify label list name repeat	what when who	List the names of the main characters in the story.
Analysis	subdivide breakdown separate categorize sort		Break the story down into different parts.
Comparison	compare contrast differentiate distinguish		Compare themes of these two stories.
Inference	deduce predict infer speculate anticipate what if...	apply conclude	How might we make this character more believable?
Evaluation	evaluate judge assess appraise defend	argue recommend debate why critique	Evaluate this story. Is it well written? Why or why not?

The second key to expanding the range of questions you can pose is to plug these action words into a growing list of generic questions. Again, consider these and add some of your own if you can:

Recall

- Define the word _____.
- What is a _____?
- Label the following _____.
- Identify the _____ in this _____.
- Who did _____?

Analysis

- What are the basic elements (ingredients) in a _____?
- What is/are the functions of _____?
- Inventory the parts of _____.
- Categorize the _____ of _____.
- Sort the _____.
- Analyze the following _____.

Comparison

- Compare the _____ before and after.
- Contrast the _____ to the _____.
- Differentiate between _____ and _____.

Inference

- Hypothesize what will happen if _____.
- Predict what would be true if _____.
- Conclude what the result will be if _____.
- What if _____ had happened instead?
- What does this information suggest?
- Given this situation (problem) what should you do?
- What rule applies in this case?

Evaluation

- What do you believe about _____?
- Judge what would be the best way to solve the problem of _____. Why did you decide that?
- Evaluate whether you would _____ or _____ in this situation. Why?
- Decide if _____ was worth it. Explain.

Use these lists of action verbs and questions to generate a complete chart on another topic of relevance to you.

ASSESSMENT PLANNING CHART

GRADE LEVEL _____ SUBJECT _____ TOPIC _____

	ORAL	TEST	PERFORMANCE
RECALL			
ANALYSIS			
COMPARISON			
INFERENCE			
EVALUATION			

Final Step: A Progress Check

In the space provided next to each exercise, enter the letter that represents the thinking skill category reflected in the item (See Appendix B for answers):

R = Recall
A = Analysis
C = Comparison
I = Inference
E = Evaluation

_____ 1. What are 3 functions of the liver?

_____ 2. Let's brainstorm what would happen if the sun did not come up tomorrow.

_____ 3. Define the word mitasis.

_____ 4. Which of the following menus is the best? Why?

_____ 5. Which menu provides more complete protein?

_____ 6. Should the use of computers be abolished in the classroom? Why or why not?

_____ 7. Who is the author of Where the Sidewalk Ends?

_____ 8. If we mix these chemicals together, what do you suppose will happen?

_____ 9. Look at the chart showing the number of meals Americans have eaten away from home in the last three years. How have eating habits changed?

_____ 10. What are three purposes of an unmanned space flight to Jupiter?

_____ 11. What are the functions of our eyelashes?

_____ 12. Which do you think will have greater impact on your life, the invention of the computer or our ability to travel in space? Why?

_____ 13. If you were going outside and it was snowing quite hard, which of the following would you need from your closet?

_____ a) Your umbrella
_____ b) A light weight jacket
_____ c) Your warm boots
_____ d) Your sandals

14. You hate rain, but know it is necessary. What are three purposes it serves?

15. In the Northwest it rains and snows a lot. Which is more vital for the necessary supply of water for summer use?

16. What are some jobs a migrant worker might perform in getting a crop of lettuce to market?

17. Haiku is a form of _____.

18. Look at the three paintings. Which makes the most use of vivid colors?

19. Suppose we had not dropped the bombs on Hiroshima and Nagasaki, how else might we have defeated the Japanese?

20. Which is a better snack for you, a fresh peach or a dish of frozen peach yogurt? Why?

MAKING ASSESSMENT WORK IN THE CLASSROOM

"The easily observable fact is that children are passionately eager to make as much sense as they can of the world around them, are extremely good at it, and do it as scientists do, by creating knowledge out of experience. Children observe, wonder, find, or make and then test the answers to the questions they ask themselves. When they are not actually prevented from doing these things, they continue to do them and to get better and better at it."

John Holt

Now that the basic structure and elements of the ASSESSMENT PLANNING CHART are in place, how do we make it work for us in the classroom? Here are some simple guidelines for:

Developing questions for daily use in the classroom

1. To repeat an earlier point: Learn and use a set of categories such as the one presented here. Ours' works well for us, but may not meet your needs. Many teachers are familiar with the taxonomy of educational objectives in the cognitive domain developed by Bloom and others (1956). For those who prefer that framework, the categories of the cognitive domain are defined and illustrated with key action verbs in Appendix C. But the key point is to choose one, learn it and refer to it for consistency.
2. Use textbooks as a guide for the selection of priority topics to be assessed throughout the range of thinking skill categories. This will assure a match between content taught and what is tested.
3. Actually develop written charts for key units and crucial concepts before teaching them. This will save planning and test development time, and it will give you a written record to use every time you teach that unit over the years.

4. Set up a file or notebook of completed charts. This will save time later when you want to retrieve them.

5. Carefully evaluate the assessments that often accompany textbooks. Even though they come from the publisher they may not match the cognitive categories covered in the text or covered in your instruction in class. If they don't match, use your own assessments or adapt and improve those that don't fit.

6. Develop questions which encourage divergent thought. This gives room for answers which might not be quite so common or usual. Divergent thought develops the following which are the basis for creative thinking:

    - Flexibility of ideas
    - Fluency of ideas
    - Spontaneity
    - Uniqueness

7. Teach your students the different categories of thinking skills. Then they'll know your expectations. Post the categories and key trigger words prominently in the classroom for easy reference by you and students during discussion.

8. Involve students in the process of brainstorming questions at different levels for their own tests. One person's thought may trigger something in another's mind. A new question is developed. This concept is called "hitchhiking." This will help students internalize the levels and it will save you test development time.

9. Have teachers using the same text or unit get together to brainstorm to develop questions.

10. Ask students what they would like to know about a new, upcoming subject. Then, they will have something at stake in the development of the unit and will better understand its purpose.

Here are some strategies for managing the assessment process:

1. When you ask a question, wait for a response. Teachers, on the average, wait less than a second after asking questions. Yet according to Rowe, (1978) a three to five second wait time seemed to improve both student responses and teacher reactions. What happens to students when teachers wait longer for the to answer? Rowe suggests that:

   - The length of student response increases. Explanatory statements increase in length.
   - The number of unsolicited, but appropriate responses increases.
   - Failure to respond decreases.
   - Confidence of children increases.
   - The incidence of speculative, creative thinking increases.
   - Teacher-centered teaching decreases, and student-centered interaction increases.
   - Students give more evidence before and after inference statements.
   - The number of questions asked by students increases.
   - The number of activities proposed by the children increases.
   - Slow students contribute more.
   - The variety of types of responses increase. There is more reacting to each other, structuring of procedures, and soliciting. The incidence of speculative thinking increases.
   - Discipline problems decrease.

   Instructors change also:

   - They exhibit more flexible types of responses.
   - The number and kind of teacher questions change.
   - Teacher expectations for student performance is modified. They become less likely to expect only the brighter students to reply and view their class as having fewer academically slower students.

2. Set up questions on 3X5 cards. These come in five colors and white. Each level of questions can be a different color.

   - You can use these when it is time to prepare your written assessment.
   - If working with the inquiry method, these cards may be put in a file box for classroom use. Students can choose which card they would like to work on individually or with a group.

3. Avoid questions which can be answered with a "yes" or "no." Or, if you use them, call for an explanation of the response from the student.

4. When a child has incompletely or incorrectly answered a question, give some sustaining feedback; follow-up with a question such as:

   - Can you explain that further?
   - Why did you think that?
   - Did you consider _____?
   - Did you remember to _____?
   - On what information do you base that?
   - What evidence suggests that?
   - Is there another way of looking at this?

   This helps the child arrive at a defensible answer and develops the higher-order skills.

5. Whenever possible during oral questioning, use all the component categories from lower to higher order to advantage. Begin with recall and proceed step by step to evaluation, making all the stops along the way. In this way, you can bring students along. Or if you start at a complex level and a student has difficulty, go back to recall and work back up to the level where the error occurred. This will reveal the nature of the error made.

6. Ask one student to paraphrase or explain what another has said.
   - John, could you say what Mary just said in different words?
   - In other words, what was Sam saying, Pete?
7. Keep the whole class involved.
   - Call on nonvolunteers regularly--so those not raising hands must remain tuned in.
   - Have them listening to add to what someone else has said. Have students frequently comment on or add to other answers.
   - Have students raise their hand, click their fingers, etc. if they agree.
   - Have students preparing to write a report, comment on or evaluate the discussion.
8. Frequently have students considering questions in groups.
   - This offers emotional support and a feeling of inclusion.
   - Usually students will be less anxious.
   - This allows for a pooling of information and generally results in the development of more ideas.
   - Individual talents may be shared and/or developed.
9. Use questions for written, as well as oral work. Several groups could be working with the same question. While five groups are discussing and working on the question for a written or oral report, the teacher could be talking with and questioning another group.
10. If students are working in groups, be sure they are aware of all sources for information. Develop with them a list of where they can go for information.

11. Be sure students working in groups know how to organize:
    - Their time.
    - Their paper, folders, files, etc.
    - Their methods of working together.
12. Use your questions for other purposes.
    - Design a bulletin board full of questions.
    - Set up a learning center with lots of choice of things to do which require higher-order skills.
13. Use your ability to develop questions to evaluate texts for a new textbook adoption, and to evaluate standardized tests considered for use in the district.
14. Be sure the students have learned (or know where to find) the knowledge (facts) upon which to develop higher level thinking.
15. Be sure you, the teacher, have adequate knowledge of the subject area so that you may be able to evaluate the thinking of your students.
16. Remember to use the various categories for all work. Do not use higher order skills during class and then switch to recall for tests or use higher order for performance but stay at the recall level on daily assessment.
17. Encourage students to become the discussion leaders or moderators.
18. Encourage students to track their own development. They can
    - compare their progress to that of others or perhaps to themselves last year,
    - rate themselves on rating scales reflecting levels,
    - keep diaries or logs of evidence of effective functioning in all categories, and/or
    - keep a file or folder of work produced and evaluations

19. Have another teacher observe your class during a typical discussion and record results.

This simple chart might serve to collect tally marks to reflect questions attempted--with correct responses circled:

Student	Recall	Analysis	Comparison	Inference	Evaluation
Jennifer	(I)(I)(I)			(I)	
Scott				III	(I)
Shaya		(I)(I)	(I)	(I)	
Travis	I	I			
Michael				II	(I)(I)(I)

By using such charts, it becomes easier at student or parent-teacher conference time to give some concrete information as to the thinking skills of a student.

20. Set criteria for grades to reflect importance of moving beyond recall. Extra points might be given for higher order skills; recall could get one point, whereas evaluation could get five.

SUMMARY

We believe that the new wave of educational improvement is focusing on the improvement of reasoning skills. These are the new "basic skills." Many state departments of education and the prominent national associations of educators are launching major developmental efforts in this direction. One key to the success of these efforts will be each individual teacher's ability to measure thinking skills in a valid and reliable manner. This guide is designed to help teachers acquire the needed assessment skills.

We have defined workable categories of thinking skills, illustrated how those categories relate to three prominent modes of classroom assessment, and provided guidelines and practice in adapting assessments to actual classroom practice. But this is only a start.

Two more critical components must be added if quality classroom assessment is to result. (1) You must continue to practice with the ASSESSMENT PLANNING CHART. This will allow you to internalize the categories so they become second nature. You will be thinking in terms of thinking skills. (2) You must continue to learn the key to sound test item writing and performance assessment. Without these basic skills--and they don't take long to acquire--the foregoing cannot serve you well. Available resources are listed in Appendix B.

We suggest that you find a partner or form a small group to grow together in these skills. You can learn much from each other.

REFERENCES

Bloom, B.S., et al. (1956). Taxonomy of educational objectives: Cognitive domain. New York, NY: David McKay.

Fleming, M. & Chambers, B. (1983). Teacher-made tests: Windows on the classroom. In W.E. Hathaway (Ed.) Testing in the schools. New directions for testing and measurement, No. 19. San Francisco, CA: Jossey-Bass.

Joyce, W., Houston, W.R., Gross, H.H., & Lee, S.D. ( ). Exploring our world: Latin America and Canada. Chicago, IL: Follett.

Quellmalz, E.S. (1985a). Needed: Better methods for testing higher order thinking skills. Educational Leadership, 43(2),

Quellmalz, E.S. (1985b). Developing reasoning skills. In J.R. Baron and R.J. Sternberg (Eds.), Teaching thinking skills: Theory and Practice. New York, NY: Freeman and Co.

Rowe, M.B. (1978). Specific ways to develop better communications. A chapter in R. Sund and A. Carin (Eds.) Creative questioning and sensitive listening techniques, self-concept approach. Columbus, OH: Charles E. Merrill Publishing Co.

Stiggins, R.J. (1984). Evaluating students by classroom observation: Watching students grow. Washington, DC: National Education Association.

APPENDIX A
Additional Resources for Classroom Assessment

Fleming, M. & Chambers, B. (1983) Teacher-made tests: Windows to the classroom. In W.E. Hathaway (ed.) Testing in the schools. New Directions in Testing and Measurement. No. 19 San Francisco, CA: Jossey-Bass.

After three years of analyzing teachers' tests in the Cleveland schools, the authors of this study provide a unique and insightful glimpse of what teachers test, how they test and (presumably) what they value in the curriculum. Initiated originally as a result of a court mandated order to ensure that all district tests, including teacher made tests, were administered, scored and used in a non-discriminatory manner, the district's test analysis probed test design, formatting, legibility, understandability, bias and most importantly the nature and quality of the test items. Results showed that the 342 tests from all grade and subject areas met requirements for non-discriminatory uses of questions, but displayed other surprising characteristics particularly in respect to the type and level of questions used most frequently.

In analyzing the kind of questions used, Fleming and Chambers report that teachers overwhelmingly preferred short answer questions and showed minimal interest in essay items. Less than 2 percent of the some 9000 items reviewed were essay based. Teachers also relied heavily on test questions that sampled knowledge of facts. Knowledge of facts along with knowledge of terms and rules constituted almost 80 percent of the test questions reviewed. On the other hand, only a minimal number of test items required students to apply learning.

The results of this review and Fleming and Chamber's recognition that what we test is what students learn because tests inevitably shape the curriculum prompted development of high quality series of modules for inservice training on classroom testing. Titled "Four Keys to Better Classroom Testing" (see following reference), these teacher training materials recommend sound strategies for improving the design and quality in classroom tests.

Four keys to classroom testing. A multimedia training package published by Educational Testing Service and distributed by CTB-McGraw Hill, Monterey, CA.

As a result of their evaluation of teacher made tests, Fleming and Chambers (see previous abstract), working in collaboration with ETS, developed this inservice training package designed to help teachers improve the quality of their day to day paper and pencil tests. The training materials provide teachers with detailed guidelines in overall test planning, test item construction (focusing on selection, supply and essay item types), test assembly and test administration.

The package has three features that make it particularly worthwhile. First, the information presented is very practical and is of high technical quality. Second, the material is presented in a nontechnical manner. Assessment procedures are clearly explained and well illustrated. And third, major concepts are illustrated in several ways. For the trainer who is not a testing specialist, the package includes a complete slide/tape presentation. For the user more conversant with testing concepts, transparencies are included to accompany the workshop presentations and exercises outlined in a trainer's manual.

This training package is well worth the cost, if the goal is to assist teachers in becoming better teachers.

Gronlund, N.E. (1982) Constructing achievement tests. Inglewood Cliffs, NJ: Prentice Hall, Inc.

This relatively inexpensive paperback is among the most concise and practical introductory textbook on educational measurement available. In a brief 140 pages, the author distills the most important measurement guidelines for assisting teachers in the assessment of student achievement via teacher-developed tests; standardized tests are not considered.

The book specifies and describes five steps for effective achievement testing: (1) specify the domain of skills to be measured, (2) develop a representative sample of assessment exercises, (3) assemble exercises into an efficient form, (4) administer and carefully interpret assessment results, and (5) use results to improve instruction.

A thorough discussion about key issues in designing or planning a quality test (teachers interested in measuring higher order thinking skills will find this discussion helpful); simple, carefully illustrated guidelines for writing good test items; useful recommendations for designing and using essay tests; and a descriptive chapter on using performance-based measures in the classroom are clearly discussed by the author. Quality control guidelines for maximizing test reliability and validity in formal and informal classroom tests are also specifically addressed.

In short, this instructional guide, written especially for teachers, is an excellent introduction to fundamental issues in educational measurement.

Spandel, V. (1981) Classroom applications of writing assessment: A teacher's handbook. Portland, OR: Northwest Regional Educational Laboratory.

This handbook provides classroom teachers with (1) the basic principles for evaluating student writing samples using holistic, analytical and primary trait scoring; (2) extensive experience in the application of these scoring strategies to hypothetical samples of student writing; and, (3) a series of very practical and immediately useful ideas for using these scoring strategies in day-to-day writing instruction.

Writing assessment, notes the author, can be used in the classroom in many varied ways. Some teachers, for example, have found that teaching students to evaluate on another's writing makes them better critics of their own work and, ultimately, better writers. Others have found that systematic evaluation of student writing--using the kinds of scoring approaches discussed in the handbook--can be very useful in diagnosing individual students' strengths and weaknesses. And still others use writing tests to select students for placement into advanced or remedial writing courses.

This handbook illustrates the many ways writing assessment can be used advantageously in teaching basic writing skills. It also provides specific guidelines for relating writing assessment to day-to-day instruction and for involving students in the writing sample scoring process in order to teach writing skills.

The handbook, moreover, represents a unique treatment of assessment issues--one tailored specifically for the classroom teacher who has no formal background in testing.

Stiggins, R.J. (1984) Evaluating students by classroom observation: Watching students grow. Washington, DC: National Education Association (ISBN 0-

This publication offers teachers specific, practical guidelines for using performance assessment to measure student behavior and/or products and specifies procedures to ensure test quality. The author contends that systematic test design and careful quality control make performance assessments an objective, useful, and valuable form of classroom assessment.

To develop quality performance assessments, the author recommends a four-step sequence of specific planning decisions and testing alternatives.

Step one involves describing the assessment situation, determining the specific reason for testing, identifying who reads and wants test results, and describing the skills and/or knowledge to be demonstrated.

Steps two and three call for a specification of the test activity and task(s) students will be asked to perform, and a description of the student's response to be evaluated. In doing so the teacher decides (1) whether a process (behavior, procedure) or product (result of doing) is to be rated, (2) what criteria will be used to judge performance, and (3) whether or not students are to be informed of the performance evaluation.

Step four requires that teachers plan rating procedures by selecting scoring methods and evaluators (teacher, another expert, students, self or peers), and by determining whether student results will be compared to one another or to a preset standard.

After outlining these essential planning steps, the author specifies key considerations in ensuring quality assessment. These include clear testing purposes, effective communication about assessment, maximizing objectivity and selecting appropriate and economical options whether one uses preplanned tests of performance or spontaneous observations of classroom behavior. This succinct booklet provides thorough guidance in using observation to measure student performance.

APPENDIX B
Answers To Quiz on Pages 27-28

1. Analysis. The key word is functions.
2. Inference. The key is the what...if.
3. Recall. The key word is define.
4. Evaluation. The keys are which is best and why.
5. Comparison.
6. Evaluation. The key is that there is a choice to be made and then a justification given.
7. Recall.
8. Inference. The key words are if and what.
9. Inference. Generalizations must be drawn on the basis of comparison.
10. Analysis. The key word is purposes.
11. Analysis. The key word is functions.
12. Evaluation. The key is that a choice must be made and justified.
13. Inference. The key words are if... which... would.
14. Analysis. The key word is purposes.
15. Evaluation. The key is that a choice and a justification must be given.
16. Analysis. The key words are what are some and might perform.
17. Recall.
18. Comparison. The key is that one particular thing is being compared in three paintings.
19. Inference. The key words are suppose and how else.
20. Evaluation. The key are the words which is better and the necessity for justification.

APPENDIX C
Cognitive Domain Levels According To Bloom

If you want to measure:	Start the exercise with these key words:		Examples
Information recall	list describe define label repeat name	fill in identify what when who when	List the parts of speech.
Comprehension	paraphrase explain review match discuss	translate interpret how why	Explain what purpose the verb serves in a sentence?
Application	apply construct draw simulate sketch	employ restructure predict how	Write a sentence that includes a noun, a verb and direct object.
Analysis	classify dissect distinguish differentiate compare	contrast categorize separate breakdown subdivide	Break down this sentence into its component parts by diagramming it.
Synthesis	combine relate put together	integrate assemble collect	Combine what you know about good sentences and good paragraphs to write an essay on ...
Evaluation	judge argue assess appraise decide defend	rate debate evaluate choose should	Evaluate this paragraph. Is it good? Why or why not?